College of Engineering Education
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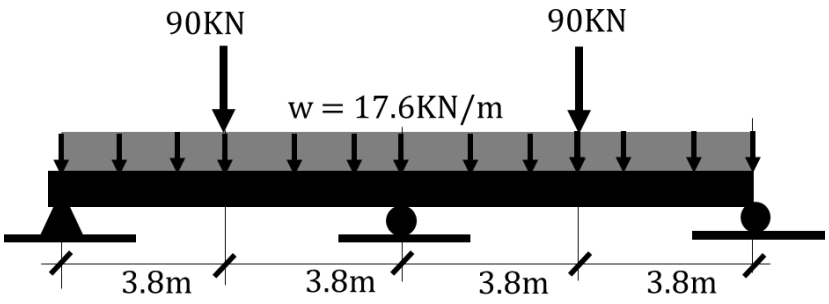
CE 603– PSAD [Engr. Calaque, Dario Jr. A]

5th QUIZ
INSTRUCTIONS:

a. CHEATING IS PROHIBITED! Mind your own paper. Any act of cheating (using of cellular phones, books, and lecture materials during examination, copying answers from your seatmate, etc.) will result to failure of examination.
b. No borrowing of calculator.

SIT01. A W450x82 consisting of Fy = 311MPa is used for a continuous span of 15.2m. It carries a uniform distributed load of 17.6KN/m and two concentrated loads of 90KN acting at the midspan between the supports. Use A36 Steel with Fy = 248MPa.



Properties of W450 x 82

A = 10452sq.mm

d = 460mm

bf = 191.26mm

tf = 16mm

tw = 9.91mm

Ix = 370.86 x10^6 mm^4

Sx = 1612.49 X 10^3 mm^3

rx = 188.47mm

Iy = 18.73 x 10^6 mm^4

Sy = 195 x 10^3 mm^3

ry = 42.42mm

rt = 50.29mm

NSCP Sec.506.2.1.2

Members which meet the requirements for a compact section and continuous over supports maybe proportioned for 9/10 of the negative moments produced by gravity loading when such moments are maximum at points of support provided that for such members the maximum positive moment is increased by 1/10 of the average negative moments.

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1. Compute the ratio of actual bending stress of the beam using NSCP Specifications to the allowable bending stress, if continuous lateral support is provided by a reinforced concrete slab.

a) 0.694

b) 0.609

c) 0.772

d) 0.798

2. Compute the ratio of the actual bending stress if lateral supports is provided only at beam supports and midspans to the allowable bending stress using NSCP Specifications. Consider 3.8m outer span only.

a) 0.694

b) 0.609

c) 0.772

d) 0.798

SIT02. Wooden planks 300mm wide by 100mm thick are used to retain soil with height of 3m. The planks used can be assumed fixed at the base. The active soil exerts a pressure that varies linearly from 0KPa at the top to 14.5KPa at the fixed base of the wall. Consider 1meter length of wall and use modulus of elasticity of wood as 8.5 $x10^3$ MPa.

3. If the wall is propped at the top, compute the lateral force (KN) at the fixed end.

a) 17.4

b) 19.8

c) 4.35

d) 32.6

4. If there is a strut at the mid-height, what pulling force (KN) of the strut will eliminate the deflection at the free end?

a) 18.7

b) 8.5

c) 13.9

d) 32.6

5. Compute the maximum bending stress (MPa) in the cantilevered wood planks.

a) 15.7

b) 14.2

c) 16.5

d) 13.0

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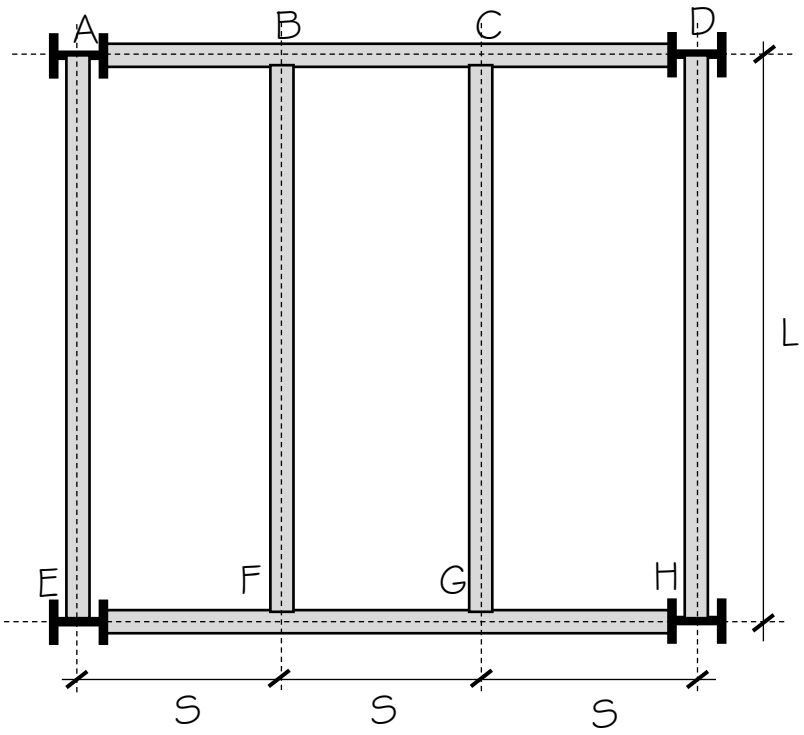
SIT03. Refer to the Figure Shown



Given:

S = 3m, L = 10m

Superimposed dead load = 6KPa

Live load = 4.8KPa

Properties of W460 x 97kg/m (Beam BF)

A = 12,320mm^2

d = 465mm

bf = 193mm

tf = 19mm

tw = 11mm

Ix = 445 x 10^6 mm^4

Iy = 23 x 10^6 mm^4

rt = 50mm

Fy = 344MPa

Consider bending about the x-axis.

6. Compute the maximum bending stress in beam BF in MPa

a) 248

b) 118

c) 217

d) 134

7. If lateral supports are to be provided, find the biggest distance (m) between lateral supports such that the maximum allowable flexural stress is Fb = 0.66Fy.

a) 2

b) 1

c) 3

d) 4

8. If the compression flange is laterally supported at midspan, what is the permissible flexural stress in MPa? Use Cb = 1.0

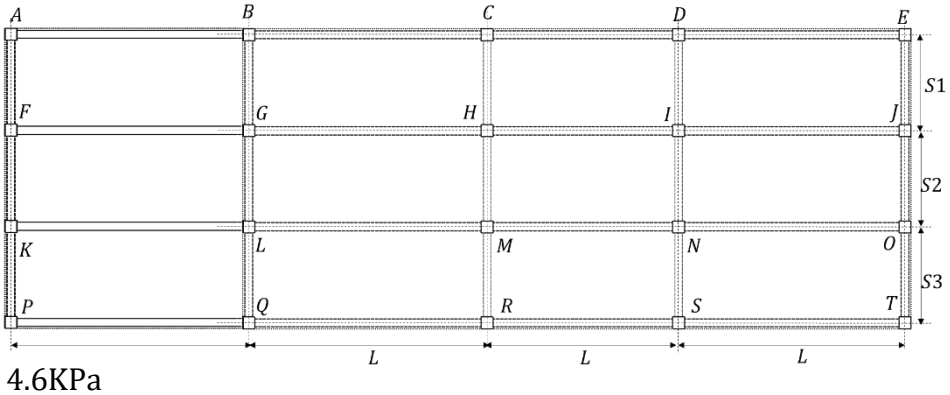
a) 117

b) 130

c) 107

d) 148

SIT04. Refer to the figure shown.



Given:

L = 8m

S1 = S3 = 2.5m

S2 = 3m

Dead load (including concrete) = 4.6KPa

Live load = 4.8KPa

For maximum stress, apply the following:

1. Pattern loading for live load

2. Ultimate load combination, U = 1.2D + 1.6L

Given in the figure are the possible load patterns and corresponding reactions, shears and moments.

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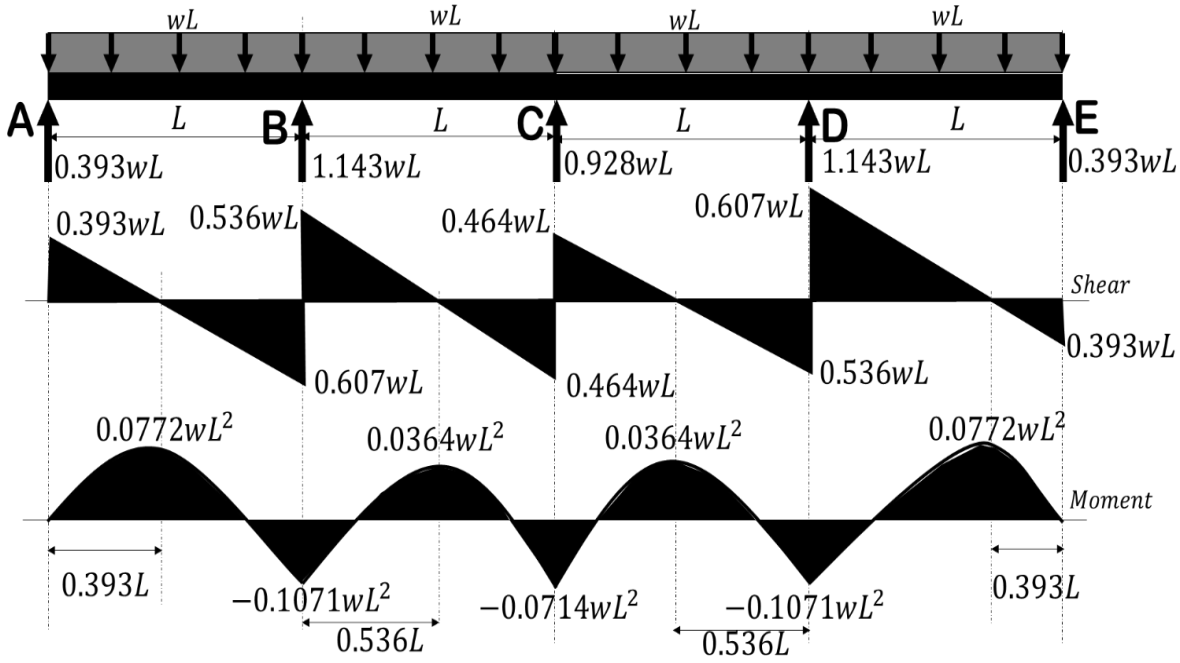
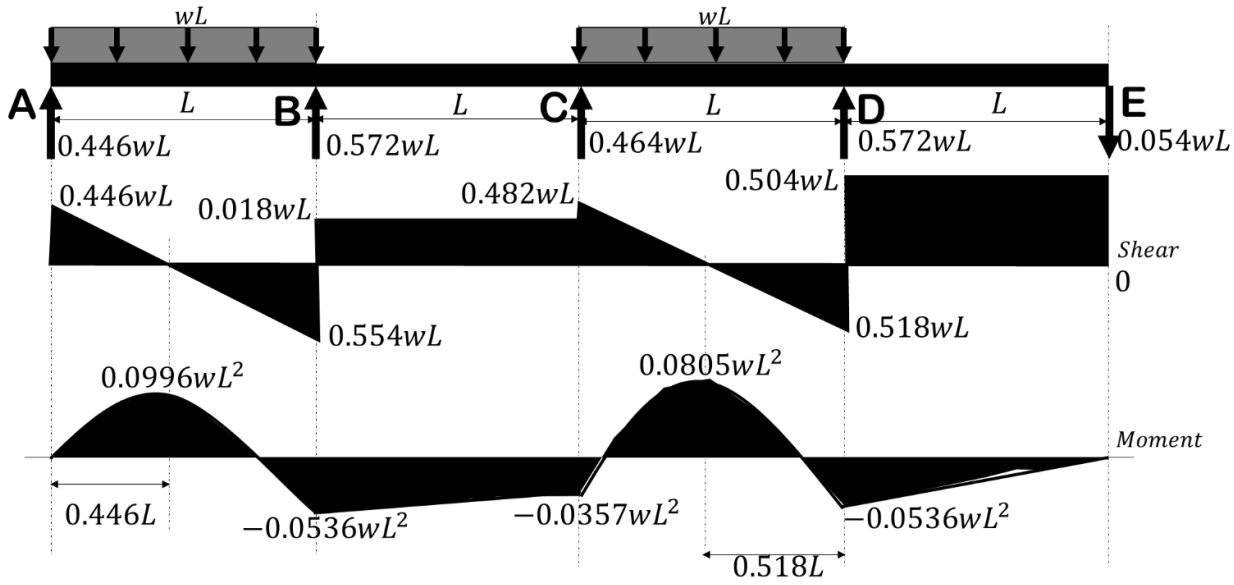
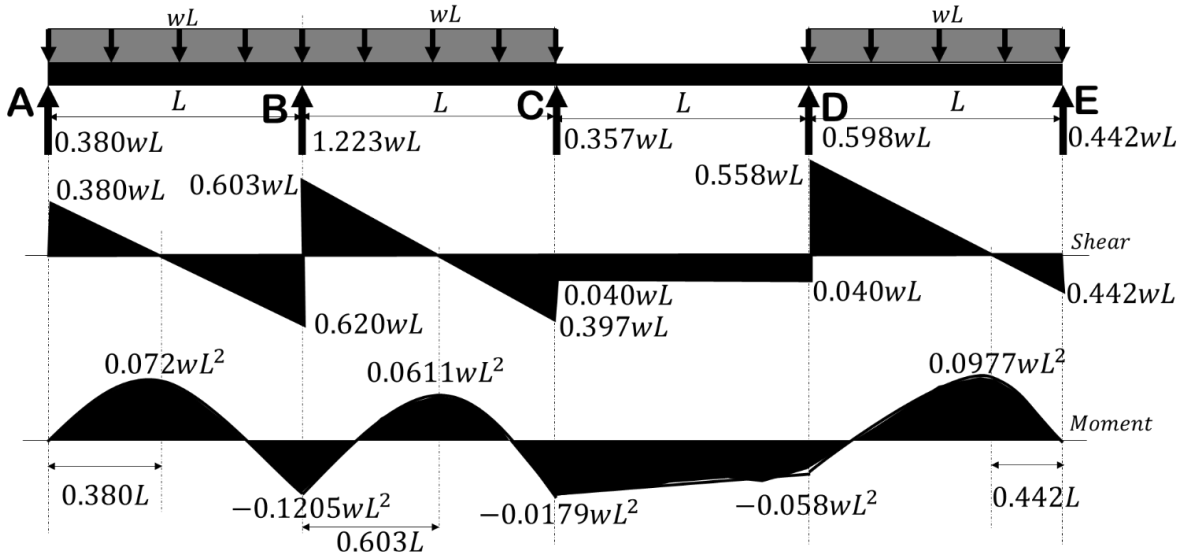






9. Calculate the maximum factored reaction (KN) at L.

a) 221.23

b) 217.56

c) 345.44

d) 290.34

10. Calculate the minimum factored reaction (KN) at O.

a) 68.025

b) 31.342

c) 106.954

d) 38.602

11. Calculate the maximum factored moment (KN-m) at L.

a) 163

b) 267

c) 244

d) 248

SIT05. Given the following data for a steel column:

Effective slenderness ratio with respect to x-axis = 53.8

Effective slenderness ratio with respect to y-axis = 144

Modulus of elasticity of steel = 200GPa

Cross-sectional area of the column = 7610sq.mm

Yield strength of steel = 248MPa

12. Calculate the allowable axial stress (MPa) for buckling about the x-axis.

a) 114

b) 142

c) 95

d) 124

13. Calculate the allowable axial stress (MPa) for buckling about the y-axis.

a) 49.6

b) 58.7

c) 36.5

d) 69.8

14. Light-grade channel C200x76 is used as a purlin of a truss whose top chord is sloped at 4H to 1V. The trusses are spaced at 6m. The total roof dead load is 720Pa and live load is 1000Pa. Wind pressure is 1.44KPa and the wind pressure coefficients at windward and leeward sides are 0.60 and 0.20, respectively.

Properties of C200x76:

Sx = 6.19 x10^4 mm^3

Sy = 1.38 x10^4 mm^3

Weight = 79N/m

Allowable Stresses:

Fbx = Fby = 148MPa

If wind loads are included in the design, the allowable bending stress is increased by 1/3.

Find the maximum spacing of purlins (in mm) due to dead load plus live load plus wind load on the windward side.

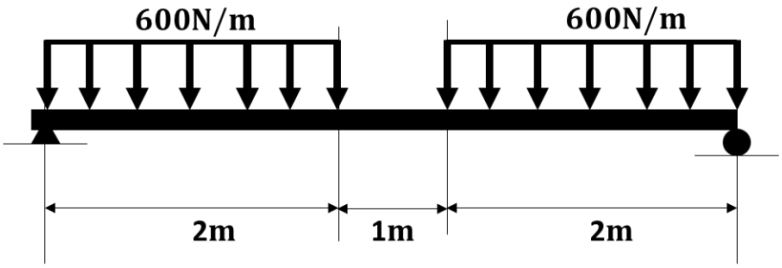
a) 610

b) 710

c) 670

d) 570

15. Compute the midspan value of EIy for the beam shown.



a) 2225N.m^3

b) 3350N.m^3

c) 4545N.m^3

d) 1005N.m^3

----------Nothing Follows----------